

DMT system by filtering the modulated data before transmission, which may provide for spectral isolation of the sub-channels. Cherubini teaches the use of a polyphase filter bank to increase the level of spectral containment of the individual sub-channels (Col. 5, lines 27-28).

Dowling is directed to a reduced complexity multicarrier precoder. Specifically, Dowling teaches a precoder that may require less computation than a Tomlinson-Harashima precoder (THP) (Col. 2, lines 46 -55). Such a precoder may reduce distortion caused by of inter-symbol interference. Dowling teaches the use of an “H” matrix that contains data related to the impulse response, intra-block interference, and inter-block interference on a channel (Col. 6, lines 6-37).

Both Dowling and Cherubini are directed to solving problems of transmission on a single channel. Neither Dowling nor Cherubini attempts to solve the problem of FEXT interference caused by several channels.

B. The Rejection under 35 U.S.C. §103(a) Over the Combination of Cherubini and Dowling Should be Withdrawn

1. The rejection of Claims 1-27 and 29-34 over the Combination of Cherubini and Dowling is Improper

On page 3, second full paragraph, the Office Action states that it would have been obvious for one of ordinary skill in the art to implement the teaching of Dowling into Cherubini “as for the receiver to accurately estimate the channel impulse response and recover the original data sequence from a received sequence channel of inter-block interference as taught by Dowling.” The Office Action cites Col. 6, lines 50-55 and Col. 8, lines 60-65 of Dowling as providing the motivation for combining the teachings of Dowling and Cherubini.

However, the passages of Dowling cited merely describe functions and elements of the precoder proposed by Dowling. For example, Dowling states, “In general a precoded transmission vector sequence refers to any vector sequence which has been precoded so that a receiver may recover an original data sequence from a received sequence where the received sequence is received from a channel having intra-block and inter-block distortion” (Col. 8, lines 60-65). This statement merely defines a term used by Dowling to describe a sequence.

The cited passages do not provide any teaching that would suggest combining the precoder proposed by Dowling with the system described by Cherubini. Furthermore, Applicants can find no teaching or suggestion in either Cherubini or Dowling that would lead one of ordinary skill in the art to combine the two references. Accordingly, the Office Action has not set forth a legally sufficient *prima facie* case of obviousness, and therefore any rejections based on a combination of Cherubini and Dowling are improper and should be withdrawn.

2. Even if the Combination of Cherubini and Dowling is Proper, the Claims Patentably Distinguish Over the Combination

As discussed above, both Dowling and Cherubini are directed to solving problems of transmission on a single channel. Neither Dowling nor Cherubini attempts to solve the problem of FEXT interference caused by several channels.

By contrast, claim 1 recites, *inter alia*, precompensation means multiplying, before transmission, a vector  $S = (S_i)$ ,  $i = 1$  to  $n$ , by a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of the plurality of transmission channels. Neither Dowling nor Cherubini teach or suggest a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of the plurality of transmission channels. Therefore, claim 1 patentably distinguishes over any combination of Dowling and Cherubini.

Claims 2 and 11 depend from claim 1, and are therefore patentable for at least the same reasons.

Claim 3 recites, *inter alia*, precompensation means multiplying, before transmission, a vector  $S = (S_i)$ ,  $i = 1$  to  $n$ , by a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of the plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 3 patentably distinguishes over any combination of Dowling and Cherubini.

Claims 5 and 6 depend from claim 3, and are therefore patentable for at least the same reasons.

Claim 4 recites, *inter alia*, precompensation means multiplying, before transmission, a vector  $S = (S_i)$ ,  $i = 1$  to  $n$ , by a precompensation matrix such that the matrix product  $H \cdot M$  is

diagonal,  $H$  being a transfer matrix of the plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 4 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 7 recites, *inter alia*, a precompensation matrix  $M$  such that the matrix product  $H*M$  is diagonal,  $H$  being a transfer matrix of the  $n$  transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 7 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 8 depends from claim 7, and is therefore patentable for at least the same reasons.

Claim 9 recites, *inter alia*, a precompensation matrix  $M$  such that the matrix product  $H*M$  is diagonal,  $H$  being a transfer matrix of the  $n$  transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 9 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 10 depends from claim 9, and is therefore patentable for at least the same reasons.

Claim 12 recites, *inter alia*, a precompensation matrix such that the matrix product  $H*M$  is diagonal,  $H$  being a transfer matrix of a plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 12 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 13 and 14 depend from claim 12, and are therefore patentable for at least the same reasons.

Claim 15 recites, *inter alia*, a precompensation matrix such that the matrix product  $H*M$  is diagonal,  $H$  being a transfer matrix of the plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 15 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 17 and 18 depend from claim 15, and are therefore patentable for at least the same reasons.

Claim 16 recites, *inter alia*, a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of a plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 16 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 19 recites, *inter alia*, a precompensation matrix  $M$  such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of the  $n$  transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 19 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 20 depends from claim 19, and is therefore patentable for at least the same reasons.

Claim 21 recites, *inter alia*, a precompensation matrix  $M$  such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of the  $n$  transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 21 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 22 depends from claim 21, and is therefore patentable for at least the same reasons.

Claim 23 recites, *inter alia*, a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of a plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 23 patentably distinguishes over any combination of Dowling and Cherubini.

Claims 24 and 25 depend from claim 23, and are therefore patentable for at least the same reasons.

Claim 26 recites, *inter alia*, a precompensation matrix such that the matrix product  $H \cdot M$  is diagonal,  $H$  being a transfer matrix of a plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 26 patentably distinguishes over any combination of Dowling and Cherubini.

Claim 27 depends from claim 26, and is therefore patentable for at least the same reasons.

Claim 29 recites, *inter alia*, a precompensation matrix  $M$  such that the diagonal of the product equals  $H*M$ , where  $H$  is a transfer matrix of the plurality of transmission channels. As discussed above, neither Dowling or Cherubini either alone or in combination teach or suggest at least this limitation. Therefore, claim 29 patentably distinguishes over any combination of Dowling and Cherubini.

Claims 30-34 depends from claim 29, and are therefore patentable for at least the same reasons.

Accordingly, claims 1-27 and 29-34 clearly patentably distinguish over Dowling and Cherubini either alone or in combination. Withdrawal of the rejection under 35 U.S.C. §103 is respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to deposit account No. 23/2825.

Respectfully submitted,  
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